The TACTICAL LINK

MIDS/Airborne Networking & Integration/Command & Control Program Offices Volume 3 Issue 4 October 2005

A Message from CAPT James Huck, Navy TDL Requirements

I am pleased to introduce this issue of the Tactical Link Newsletter. As the Command and Control Systems Branch Head on the CNO's staff (OPNAV N71), I deal directly with translating fleet user needs into requirements and then planning, programming, budgeting, and executing the plan, in partnership with Mr. Mike Spencer and CAPT "Slammy" Prater, to deliver systems that provide the needed capability. The exchange of ideas within the TDL community, that this newsletter fosters, directly contributes to the success of this process. *The Tactical Link* also provides opportunity for each of us to see how others are dealing with the TDL challenges that are encountered in our multi-service and multi-national community.

This issue shares information on a several TDL topics. There is an article that describes a successful three-week exercise conducted by the Australian Defense Forces with U.S. Armed Forces. There are four articles that address interoperability solutions through the Air Force/Navy Common Link Integration Processing (CLIP) system, the Army's Common Data Link Interface Module (CDLIM), the NATO Improved Link Eleven (NILE) (Link-22) program, and Ethernet/GFP usage. Additionally, I am sure you will find the article discussing the integration capabilities of the Operations & Tactics Integration Suite (OTIS) implemented by the 27th Fighter Wing as well as the latest news from the MIDS JTRS Product Development Review, the 2005 International Data Link Symposium (IDLS), and the MIDS International Review Board (MIRB) to be well worth your time.

The Tactical Link provides insights that are of interest to everyone. I thank the authors for their initiative to keeping communication flowing throughout the TDL community. I encourage all to engage in this venue and write about your thoughts and experiences that the rest of us can benefit from. Through your participation, the TDL community will continue to be all that much better.

Jim Huck

Inside this issue:

JDICE - Increasing Situational Awareness

Contributed by: Perry Koger, JDICE Senior Analyst, Nellis AFB, Nevada

"This exercise provided a unique opportunity to test our products in a realistic, joint environment." Colonel Billy Gilstrap, Director of the Joint Datalink Information Combat Execution (JDICE) made this comment after successful testing during Talisman Saber 2005 (TS 05) exercise in Australia. The JDICE Joint Test & Evaluation (JT&E) project deployed a team from Nellis AFB to support the three week exercise that tested the ability of the US Armed Forces and the Australian Defence Force to form a combined task force to execute short warning, power projection and forcible entry scenarios.

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JDICE (Cont)

Over 16,000 warfighters participated in this dynamic tactical air, land, and sea exercise focused in the Shoalwater Bay Training Area near Rockhampton, Queensland, Australia. Beginning in February 2006, follow-on joint field testing will again combine all elements of joint warfighters, fielded systems and realistic targets.

The Office of the Secretary of Defense established JDICE to develop joint tactics, techniques and procedures (JTTP) and associated Link-16 network architecture modifications to increase situational awareness at the tactical level, emphasizing deconfliction, fratricide prevention and targeting.

At Sea - Aboard the USS Kitty Hawk, the Combat Direction Center (CDC) functions at high speed

The JDICE JT&E project focuses on the offensive (reduction in fratricide potential) and defensive (threat avoidance) deconfliction and targeting processes that employ JTTPs to filter data and enhance a tactical operator's ability to identify and transmit actionable data. The overall objective is to provide tactically significant information to warfighters on the ground, in the air, and at sea to "save lives" through deconfliction from friendly forces/threats and to "improve mission effectiveness" for targeting and weapons delivery.

JDICE's primary goal is to improve the warfighter's Common Operating Picture (COP) of the tactical battlefield with timely, accurate, and complete information. JDICE specifically focuses on rapid dissemination of critical actionable information that doesn't overload users. This involves reducing the time for operational information to pass through command and control (C2) nodal stop points and reach tactical level operators while filtering out excess, duplicative information. In order to accomplish this, a man-in-the-loop solution has been integrated into appropriate component operational level C2 facilities.

During TS 05 the JTTPs were executed from the Joint Fires Element of the Combined Joint Special Operations Task Force at Lavarack Barracks in Townsville, Queensland, Australia with most of the JDICE team interacting with various US Special Operations Forces (SOF) and Australian Special Air Service units. JDICE team members also collected Link-16 and associated data from the amphibious command ship USS Blue Ridge (LCC 19), aircraft carrier USS Kitty Hawk (CV 63) with its complement of E-2C Hawkeyes and F/A-18 Hornets, and guided missile cruiser USS Cowpens (CG 63). JDICE provided a COP of the joint ground, sea and air operations to the warfighters and key commanders. This was accomplished by using the JDICE developed JTTP and sending tactically significant information over Link-16. JDICE successfully demonstrated that the JTTP provided timely, accurate, complete and tactically significant SOF information to Link-16 equipped platforms.

TS 05 provided an intense, dynamic and realistic environment to demonstrate the value of the information JDICE can provide to the warfighter because of the level of SOF involvement. The SOF scenarios included the targeting of terrorist camps, ship boarding, attacks against high value targets, strategic reconnaissance and personnel recovery operations. The SOF missions and associated F/A-18 Hornet aircraft support from the USS Kitty Hawk were key elements in evaluating the JDICE JTTP and assessing how it affects situational awareness, mission effectiveness and fratricide prevention from the aircrew's viewpoint.

Colonel Gilstrap thus summarized the value of TS 05: "By teaming with large scale exercises like this one, we are able to cost-effectively collect an enormous amount of significant data and ultimately provide the warfighter with well-tested tools for combat."

J-DICE?

"Plug-and-Fight" with Common Software = CDLIM

Contributed by: Harry Coffman, Techni-Core Engineering, Inc., AMRDEC SED, Redstone Arsenal, Huntsville, Alabama

"Stove-piped" tactical data link (TDL) systems, systems not interoperable with coexisting systems, have challenged the Army just as they have the Air Force and Navy. The Army Air and Missile Defense (AMD) community has been working to solve such challenges over the past few years. Army AMD began evolving a TDL processing solution from existing software that could meet the needs of more than just one platform during development of the Army Joint Range Extension (AJRE) hardware-software suite currently deployed in the Patriot AMD weapon system. In July of 2004, the Program Executive Officer for Missiles and Space created the Project Manager for Integrated Fire Control (PM IFC). One PM IFC mission is to achieve convergence of the multiple Army AMD communications processors into a common software product that meets both Joint and Army requirements.

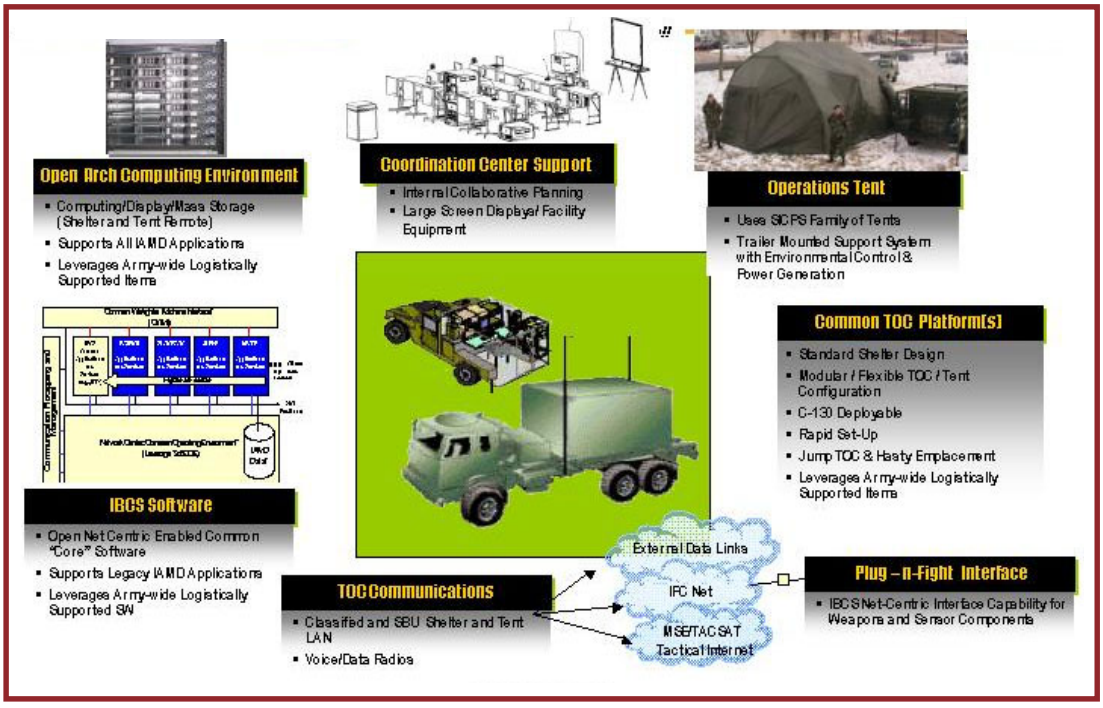
Genesis of the IBCS and CDLIM

PM IFC's over-arching mission is to develop, test, field, and sustain a Common Battle Command Capability (CBCC) for Army AMD. Its answer to a CBCC is an Integrated AMD (IAMD) Battle Command System (IBCS) which provides mobile AMD operations consisting of tents, common tactical operations center (TOC) platforms, TOC communications, an open architecture computing environment, and a "plug-and-fight" interface capability for weapon and sensor components. Shortly after its inception, PM IFC decided to employ the Carnegie-Mellon Software Engineering Institute's (SEI) approach for creating an IBCS common software product line (SPL).

PM IFC inherited AJRE's software evolution — the product of mining legacy TDL software modules from multiple platforms and integrating them into a single architectural framework — to serve as the product baseline for the IBCS' plug-and-fight, weapon-sensor interface. PM IFC adopted this software-only product into the IBCS SPL and in February 2005 named it the Common Data Link Interface Module (CDLIM).

CDLIM Start-Up and System Overview

PM IFC employed the SEI Capability Maturity Model (CMM) Level 4 software expertise of the Aviation and Missile Research, Development and Engineering Center's (AMRDEC) Software Engineering Directorate (SED) to manage CDLIM and the IBCS SPL development. Bringing the then-prototype CDLIM under a CMM process umbrella was a challenge in the midst of continuing software



IBCS - Providing a Common Battle Command Capability

Continued on page 4

CDLIM (Cont)

"With similarities to CLIP's emergence in the Navy and Air Force, CDLIM is emerging in the Army as the key enabler....."

Continue to read CLIP similarities on page 5

development, fielding new hardware-software suites, and supporting already-fielded software. However, the PM IFC-SED team successfully kicked-off CDLIM Spiral 2.0 development under CMM Level 4 on 14 July 2005, with a process upgrade to SEI CMM Integration Level 5 planned for 2006.

The primary objective of CDLIM is to provide a robust, configurable, non-proprietary, open, and scalable capability to enable interoperability between multiple weapon and sensor platforms through various message protocols. It is currently configurable to operate on Solaris or Linux servers and workstations, on a single board computer or on an adjunct processor. Supported protocols include Link-16, Variable Message Format (VMF), JREAP B/C, Serial J, SIMPLE J, EPLRS IP, Platform J/MIDS IP, and Forward Area Air Defense Data Link (FDL).

Multi-Service Partnership on the Horizon

Representatives from the Navy-Air Force Common Link Integration Processing (CLIP) Program Office met with PM IFC at Redstone Arsenal (Huntsville, Alabama) on 30 August 2005 to explore collaboration opportunities during the development of CLIP and CDLIM. The following joint statement resulted: "PM CLIP and PM IFC programs will pursue a convergent path for program development and implementation of common requirements while supporting platform and service unique operational requirements and implementation schedules consistent with each program's Acquisition Baseline and Acquisition Strategy." A follow-on meeting was held 11-12 October 2005 in San Diego, which will be addressed in the January 2006 *Tactical Link* issue under CLIP news.

The Way Ahead

With similarities to the CLIP emergence in the Navy and Air Force, CDLIM is emerging in the Army as a key enabler for the transition to net-centric tactical communications, providing simultaneous processing of data received and transmitted over multiple link protocols. PM IFC and the AMRDEC SED are in the midst of rigorous software development for CDLIM under SEI guidelines. A CLIP/PM IFC partnership holds possibilities for another step in improving TDL interoperability between all the services.

TACTICAL LINK UPCOMING EVENTS

SPAWAR Industry Conference	8-10 Nov	San Diego, California
MIDS Technical Working Group (TWG) #19	14-17 Nov	Wayne, New Jersey
NATO Improved Link Eleven (NILE) Operation Implementation Working Group (OIWG)	14-18 Nov	Wilhelmshaven, Germany
MIDS JTRS Integrated Product Team (IPT)	15-17 Nov	Cedar Rapids, Iowa
FORCEnet Engineering Conference	15-17 Nov	San Diego, California

Moving at a Fast CLIP

Contributed by: Tom Ryan, Navy CLIP Team Lead, PMW150, PEO C4I & Space, San Diego, California

Common Link Integration Processing (CLIP) is an Air Force/Navy software program to enhance Tactical Data Link (TDL) interoperability. This is the first in a planned series of articles that will describe the program, its development, capabilities and implementation.

Background

The Chief of Naval Operations authorized dissemination of the first Core Avionics Master Plan (CAMP) in 2001. The CAMP provided guidance, in part, to avionics sponsors and program managers to address capability shortfalls. One key shortfall was the number of TDLs in naval aviation needed to reduce fratricide, improve interoperability and provide a common solution for TDL message processing. The latter would also minimize integration costs. The Navy began an effort under NAVAIR PMA-209's Strategic Planning Team called Common Tactical Data Link Software. Meanwhile, the Air Force TDL System Program Office (SPO) at Hanscom, AFB pursued a similar effort after having completed a cost benefit analysis that showed significant cost savings could be achieved through a common TDL solution for Link-16. The analysis suggested that interoperability could be improved through common software applied to all Air Force platforms. At that point, PMA-209 and the TDL SPO joined forces and began a program called Tactical Data Link Common Software (TDLCS). In the fall of FY02, TDL experts representing SPAWAR PMW101/159, NAVAIR and Air Force SPO met and formed an informal IPT. Work began in earnest to develop a Statement of Work (SOW) and Software Requirements Document (SRD). The documentation required by DoD Instruction 5000 was prepared to formalize the acquisition. The Navy became the acquisition lead, with the Air Force in a cooperative joint management role. The program name was revised to Common Link Integration Processing (CLIP).

Acquisition Process

A Capability Development Document (CDD) was developed and approved by the Air Force Requirements Oversight Council (AFROC) in January 2004 and the Joint Requirements Oversight Council (JROC) approved in June 2004. The SOW and SRD were completed in May and June 2004 and the Acquisition Strategy Report approved in August 2004.

A Full and Open Competition resulted in a Cost-Plus Award Fee contract award to Northrop Grumman Mission Systems in June 2005 to develop Increment 1 of CLIP. CLIP will be developed in four increments, each building on the previous increment to assure operational functionality before the software complexity is increased. The follow-on increments will be awarded as options to the basic contract based on contractor performance and funding availability.

If options are exercised as planned, the program will run through early FY12.

Current Status

Northrop Grumman has successfully completed the Software Requirements Review (SRR) for Increment 1. The Preliminary Design Review (PDR) is scheduled for November 2005 with the Critical Design Review (CDR) planned for January 2006. Increment 1 includes the following functionality:

- Core Architecture
- Common Host Interface
- Link-16 (Meets requirements of MH-60, B-1B, B-2 and A-10)
- JREAP (A, B, C)
- S-TADIL J
- EPLRS 11.x

The Test Readiness Review (TRR) for the final functional CLIP Increment 1 software is scheduled for September 2006, with final delivery of fully functional CLIP Increment 1 planned for early 2007. An early delivery of e-CLIP, a subset of Increment 1 capabilities, will be available for platform integration testing in March 2006.

Subsequent CLIP increments will include total Link-16 functionality, Variable Message Format (VMF), Wideband Networking Waveform (WNW) interface compatibility, Navy N-series, IP Interface, Link-11/11B, Link-4A, Link-22, Integrated Broadcast Service (IBS) interface, Tactical Airborne Networking, and as required, upgrades and Interface Change Proposals (ICPs) to previous increments.

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Watch for these follow-on CLIP articles:

- ***Capabilities/Performance***
- ***Schedules/Availability***

CLIP (Cont)

Future Benefits

In its final form, CLIP will revolutionize how TDLs are implemented and processed on platforms. Its open architecture and the Common Host Interface (CHI) will minimize platform impacts. The CLIP software flexibility will permit configurations that will allow host platforms to minimize software overhead beyond the Architecture, CHI and its TDLs. The goal of a common solution for Link-16 and VMF capability for airborne platforms will have been achieved.

THE CLIP TEAM

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Cannon AFB is the only CAF base with all three of these data links.

- ***Link-16***
- ***SADL***
- ***IDM***

OTIS - Making Net-Centric Warfare a Reality

Contributed by: Capt Douglas Charters, USAF, Chief Datalink Integration, 27th FW Link-16 Wing Manager, Cannon AFB, New Mexico

Tactical Data Links (TDLs) in fighter aircraft have dramatically increased war fighting capabilities while introducing the new challenges of Net-Centric Warfare (NCW) into planning, training, exercises and deployments. A key element of NCW as it applies to fighter aircraft is tactical nodes with robust data link capabilities that provide the means to integrate into the larger Multi-Tactical Datalink (Multi-TDL) picture.

Broad Spectrum of Capabilities and Requirements

The 27th Fighter Wing (FW) at Cannon Air Force Base (AFB), New Mexico has a particularly unique challenge. The 27th FW has three F-16 squadrons, each with its own type of TDL. One squadron has Link-16, one has the Situational Awareness Data Link (SADL), and the other has the Improved Data Modem (IDM). Each system has its own requirements and capabilities. The challenge at Cannon, the only base in the Combat Air Forces (CAF) with all three of these data link capabilities, was to achieve the interoperability required to fully exploit the capabilities of each configuration.

System Components

Major Robert Winkler, former 27th FW Weapons Officer, developed an idea to integrate a variety of components into what is called the Operations & Tactics Integration Suite (OTIS). The hardware/software is purchased from a number of vendors. Each piece adheres to MIL STD performance specifications that facilitate seamless connectivity. Dual systems were purchased to meet both home station and deployed requirements. The major components of the OTIS include:

- ***Two Joint Air Defense System Integrators (JADSI)***
- ***MIDS LVT-7 (no TACAN, no voice)***
- ***MIDS LVT-6 (TACAN, no voice)***
- ***Two Battlefield Operational Support Systems (BOSS)****
- ***EPLRS Radio***
- ***Transparent Multi Platform Gateway (TMPG)***
- ***Improved Data Modem***

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OTIS (Cont)

***BOSS**

For OTIS related reading, read "Who's the Boss?" in the January 2005 Tactical Link Newsletter.

- ***TBMCS Force Level***
- ***INMARSAT & Iridium Data/Voice Terminals***
- ***PSC-5D radios for Beyond Line of Sight needs***
- ***Eight computers with Portable Flight Planning Software (PFPS)***
- ***Secure router & associated communications equipment***
- ***Associated antennas, power supplies, mounting racks, cooling, and cabling/ connectors***

Expeditionary Mission Planning Cell

A key OTIS capability supports mission planning. The OTIS has the capability to receive, process, plan, and execute Air Tasking Orders (ATOs) in any environment. Prior to OTIS, a 12-person mission planning team could produce 25 missions in 12 hours. With OTIS automation, the same team can produce 300 missions in the same period.

Operational Applications

The operational goal of the OTIS is to integrate the air defense picture of the Air Defense Sectors and supporting air defense units. The suite can fuse and transmit air, land, and sea tracks. The integrated information is transmitted to 27 FW assets via Link-16, SADL, and IDM. The dual equipment capability allows them to employ this information both at home station and deployed locations. Personnel are trained to conduct live Link-16 operations with the E-3, route pertinent data to and from the Western Air Defense Sector (WADS), and integrate SADL players into the common picture via the "gateway." This training applies to deployed operations where the 27th Wing Operations Center (WOC) can directly interface with the Combined Air and Space Operations Center (CAOC) through the ADSI, and establish local link operations with a deployed MIDS LVT-7, BOSS tactical host, and SADL Gateway. Thus another node is created in the CAOC's robust TDL picture, and extends NCW to the Wing.

The Human Factor

The 27th FW, like other fighter wings, has no billet for a Joint Interface Control Officer who specializes in data link planning and operations. The Wing has designated the Link-16 Wing Manager, a graduate of the Joint Multi-TDL course at Fort McPherson, Georgia as the "data link integration officer." Training and motivation have made this a successful effort. Also, as pilots rotate through this position, the Air Force knowledge-base of link-savvy pilots is increased.

Peacetime training should replicate as closely as possible the conditions the warfighter will encounter in combat.

First and foremost, the OTIS allows the 27th FW to train like they will fight.

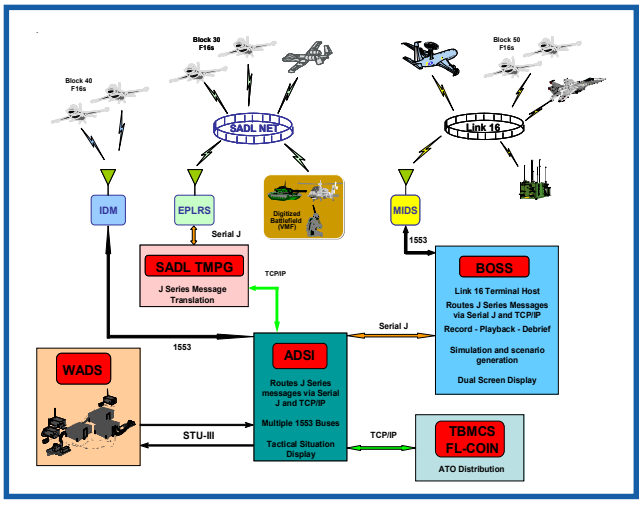
Specifically, every unit in the 27th FW will be accustomed to operating in a multi TDL environment on a day to day basis. This prepares each warfighter for expeditionary operations and greatly enhances their ability to seamlessly integrate into theater data link operations.

Network Centric Warfare

As a tactical node in the NCW construct, the OTIS provides critical connectivity for the WADS homeland defense mission. In deployed locations, the OTIS provides the ideal Regional Interface Control Officer (RICO) environment at the WOC level. The 27th FW sees the OTIS as an innovative example of operational people working in a budget-constrained environment to achieve an NCW goal of "intelligent application of information technologies." Superior NCW capabilities have been achieved through effective training, and quality, motivated people.

OTIS is just one example of making Net-Centric Warfare a reality:

People, Training, and System Capabilities are equally important to the ultimate goal of seamless connectivity.



Configuration used at Cannon AFB

FEATURED INTERVIEW

CDR JEFF DUNLAP

CSO

USS RONALD REAGAN (CVN-76)

PERSONAL HIGHLIGHTS

- ***Born in York, Pennsylvania***
- ***Bachelors of Science Degree in Engineering - Virginia Tech***
- ***Master of Science in Naval Engineering - Postgraduate School in Monterey, California***
- ***Main Propulsion Assistant and Combat Information Center Officer***
- ***Assistant Defueling Project Superintendent for the USS Bancroft (SSBN-643)***
- ***Link-16 / JTIDS fleet support officer***
- ***CSO onboard USS Tarawa (LHA-1)***
- ***Deputy Program Manager for the Advanced and Tactical Tomahawk Weapons Control Systems***
- ***CSO onboard USS Ronald Reagan (CVN-76)***

Q: ***Could you please describe your responsibilities as the Combat Systems Officer (CSO) with respect to Tactical Data Link Operations?***

A: My primary responsibilities are the preventative and corrective maintenance of the Common Data Link Management System (CDLMS), JTIDS, SRC-27 UHF transceivers, HFRG radios and SATCOM DMR radios.

Q: ***What Operations are you in charge of?***

A: I am not really in charge of "Operations" although I am, and many of my personnel, are qualified operators and watchstanders.

Q: ***What systems are dependent on Tactical Data Link capabilities?***

A: The USS Ronald Reagan has Ship Self Defense System (SSDS), Global Command and Control System-Maritime (GCCS-M), and Air Defense System Integrator (ADSI) systems. The latter has been recently installed.

Q: ***Who is involved in making sure your systems are operational and meeting fleet needs?***

A: The support for USS Ronald Reagan's TDLs has been outstanding. We have support from the Program Offices, the In-Service Engineering Activity (ISEA) and their support contractors, and the Southwest Regional Maintenance Center (SWRMC). Since the USS Ronald Reagan is a Test and Development (T&D) platform supporting SSDS MKII Mod 1, we have had a constant supply of technical representatives for various systems including the TDLs to support the Operational Test and Evaluation Force's (OPTEVFOR) objectives.

Coming up in October 2005 we will be working with multiple ships to support the last stage of the follow-on test and evaluation. Testing will include USS Ronald Reagan's ability to establish and maintain data link connectivity with these other ships while in a Combat Engagement Capability (CEC) net and under a simulated missile attack.

Q: ***What aspects of this job do you find the most challenging?***

A: We are still working out new systems on board the USS Ronald Reagan that utilize newer technologies that still have integration or implementation issues. The introduction of systems like the new rudder angle indicator also requires my attention. Additionally, we are in the process of upgrading from having a ship built for A T M communications to one that is IP enabled. We had to wait for delivery before we could make the upgrade. Right now, USS Ronald Reagan is a unique "one of a kind," and our problems tend to be one-of-a-kind problems. It is nice to be new, but that includes the honor of leading the way in issue resolutions.

Q: ***In what direction should our TDL programs head?***

A: The biggest challenge is *Interoperability*. We always thought Link-11 would fade away with the introduction of Link-16. It is now apparent that we need to continue to accommodate both. True joint and allied interoperability is the key to information dominance.

Q: ***What are you looking for in the fleet?***

A: Technical advances that resolve the human-machine interface (HMI) burden on the operators. We need to learn from the systems in place now and incorporate improvements in the future. We look forward to eventually having the Joint Interface Control Officer (JICO) Support System and the introduction of Link-22 (NILE) {NATO Improved Link-Eleven}.

Q: ***What would you say has been the most significant improvement in the evolution of TDLs during your career?***

A: I believe the leap from a netted Link-11 to the nodeless, longer range Link-16 system.

Q: ***What other improvements have you seen in the past years?***

A: A large emphasis was put on training schools and it has paid off. Technicians are much better trained now. The schools literally put out "experienced" technicians. This puts us at a stage where we can pretty much figure out our own problems.

Also, today's displays are colorized and employ multiple-shaped symbols. These features help users actually visualize the scenarios, which subsequently convert data into knowledge. The next leap will move us from a two-dimensional picture on a one-dimensional screen to a three dimensional presentation.

As Rear Admiral Miller, Commander Carrier Strike Group 15, stated, "We have the data, but the challenge is converting it into knowledge." We haven't completed the leap yet, but self-defense technology is continuously improving.

Bringing Link-22 to Life

Contributed by: NILE Program Management Office, PMW 780, PEO C4I & Space, San Diego, California

Link-22, like Link-16 and Link-11, will interconnect ships, submarines, aircraft and ground based tactical data systems in order to provide warfare commanders with a clear and concise tactical picture. It operates in the HF (2-30 MHz) and UHF frequency ranges (225-400 MHz) in both Fixed Frequency and Electronic Protection Measures (EPM) modes and is optimized to operate out to 300 nautical miles. The NATO Improved Link Eleven (NILE) Project that produced Link-22 is a collaborative seven-nation project that includes Canada, France, Germany, Italy, Spain, the United Kingdom and the United States.

Link-22 will operate as a standalone tactical data link or can augment Link-16 with a beyond-line-of-sight capability that does not rely on a satellite channel.

Technical Description

The system consists of the following components:

♦ System Network Controller (SNC) whose function is to determine appropriate transmission pathways. It connects to a unit's Data Link Processor (DLP).

♦ Link Level COMSEC (LLC) which provides data encryption and decryption services. This connects to nationally implemented Signal Processing Controllers (SPCs) and radios.

♦ Test Tools. In addition to a standalone NILE Reference System (NRS), a Link-22 interface has been developed for the existing Multi Link System Test and Training Tool (MLST3).

Key Features

♦ Up to eight separate RF networks build a Supernetwork. An individual unit can be a member of up to four RF networks

♦ Inclusion of an integral COMSEC device

♦ Dynamic TDMA allows nets to be reconfigured based on changing requirements

♦ Same dictionary elements and 90% message format as Link-16 to facilitate data forwarding

♦ Relay capability allows units to pass messages between units that are not within RF range

♦ A Late-Net-Entry feature that allows units to join a net already in operation without interruption

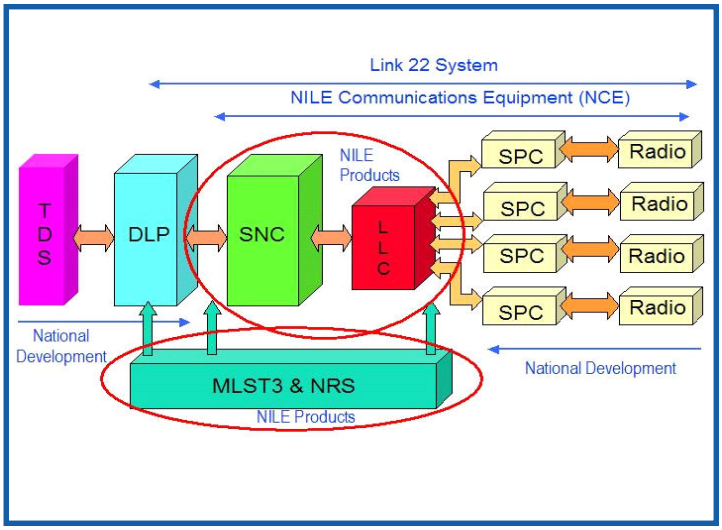
♦ The SNC runs on Commercial Off-the-Shelf (COTS) PCs

Implementation

France, Germany, Italy and the United States have current plans to field the system starting in 2007. Specifically the US has contracted for the Link-22 system to be fitted as part of the Adjunct Processor to the CDLMS, also called Next Generation Command and Control Processor (NGC2P). The US Navy currently plans for fielding over 100 units.

Third Party Interest

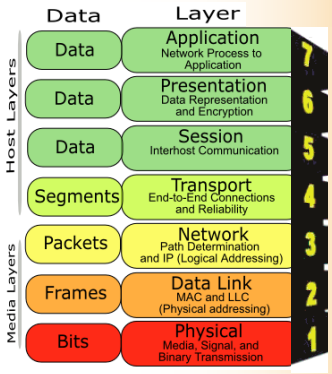
This year has also seen a significant interest from a number of nations wishing to procure Link-22 systems. The PMO is currently staffing formal Third Party Sales requests from Japan and Turkey.



Interoperability Through Ethernet/GFP

Contributed by: Ricky Greer, NAVAIR UAV Communications Lead, Paxtent River, Maryland

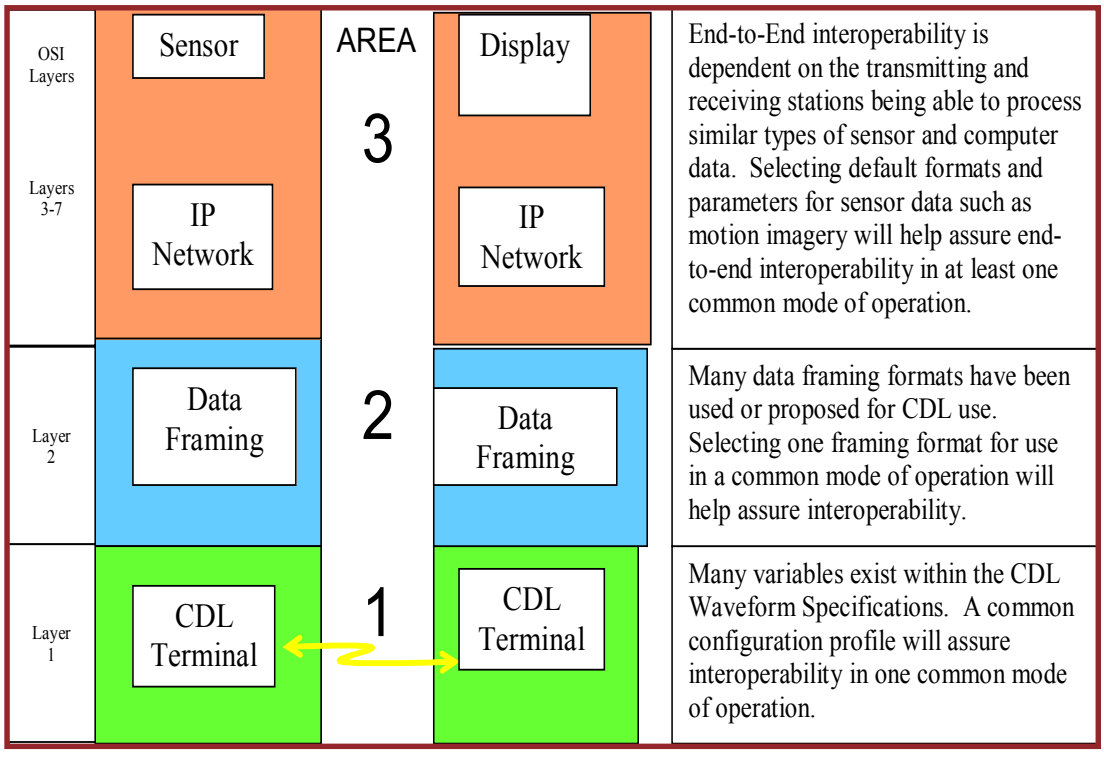
OSI 7-Layers



"Interoperability" is the watchword and Holy Grail for the Tactical Data Link (TDL) community. Yet, true Data Link interoperability or "Commonality" has yet to be achieved in many of today's fielded Common Data Link (CDL) systems. CDL is a Ku-Band or X-Band point-to-point microwave link used by Intelligence, Surveillance, and Reconnaissance (ISR) platforms to transmit imagery and other payload data to a Ground Control Station (GCS) and to receive GCS Command and Control (C2) data. The use of CDL on ISR platforms is mandated by the Department of Defense (DoD). Interoperability has focused on the segment between data link terminals on airborne collection platforms and their receiving station (either ground or air). However, true interoperability should include everything between the collecting sensor and the displays on other types of collection platform and/or receiving stations.

This sensor-to-display or "end-to-end" interoperability may be addressed in three areas: (1) compatible data links, (2) standardized framing of data for transmission over the link, and (3) interoperability outside of the data link, including common sensor data formats. Without defining the parameters, each area is defined in a manner that offers options that permit programs to select varying combinations of parameters for their systems. As a result, CDL equipment manufacturers have tended to develop proprietary systems unable to demonstrate end-to-end interoperability between different systems. The Tactical Common Data Link (TCDL) Interoperability Profile developed by the Naval Air TCDL Special Interest Group (NATS) uses these areas to ensure interoperability between a pair of terminals.

The three areas of interoperability discussed above, map to the seven layers of industry's *Open System Interconnection*, an ISI Standard for worldwide communications that defines a networking framework for implementing protocols. Control is passed from one layer to the next, starting at the application layer in one station, proceeding to the bottom layer, over the channel to the next station and back up the hierarchy.



Common Data Link End-to-End Interoperability Requirement

Continued on page 11

Ethernet/GFP (Cont)

"The Interoperability Profile is not a specification — it is a profile of parameters....."

To request a copy, contact Ricky Greer at ricky.greer@navy.mil

Area 1. CDL Configuration: Data terminal interoperability occurs at the radio. This is partially addressed in the current CDL Waveform Specification. The specification provides selectable variables so programs can tailor data links to specific missions. However, this flexibility can also limit interoperability among systems. These variables provide 936 permutations for CDL design. The Interoperability Profile starts with the CDL Waveform Specification, but limits the number of permutations to one with a common set of parameters. This enables one common mode of operation that will guarantee interoperability. These configurations are addressed in Appendix II, Annex B of the CDL Waveform Specification. CDL systems are not restricted to this one mode of operation, but are requested to include this as an available mode as the "NAVAIR Interoperable Mode" between all future CDL systems.

Area 2. Framing Formats: During the evolution of CDLs, several methods have been developed and/or proposed for data framing, including Asynchronous Transfer Mode (ATM), Ethernet encapsulated within Generic Framing Procedure (GFP) frames (i.e. Ethernet over GFP), Packet Mux (proprietary system built by L-3 Communications), and Internet Protocol (IP) over GFP. An objective of the Interoperability Profile is to establish Ethernet/GFP as defined in Appendix II, Annex B of the CDL Waveform Specifications as the common framing protocol for interoperable Naval CDL systems, and to establish the Ethernet port as the network interface between the CDL terminal and external user-side networks. CDL systems are not restricted to this one framing format, but could include this mode of operation as the common data framing format for future CDL systems for bit rates 45 Mbps or less. A proposal has been submitted to the CDL Program Office to include rates up to and including 274 Mbps.

Area 3. Interoperability Outside the Data Link: Networking capabilities are implemented through standards, protocols, and methods external to the data link itself. Networking is an important consideration in the overall interoperability of CDL systems. To achieve end-to-end interoperability among CDL systems, it is essential that commonly used application-layer protocols be compatible. The Interoperability Profile goes beyond traditional CDL protocol boundaries to establish minimum interoperable standards through the total system to the display format. The Interoperability Profile references existing standards such IP and User Defined Protocol (UDP) for transport over the network. The Joint Technical Architecture (JTA) and the Motion Imagery Standards Profile (MISP) are used to designate a standard format and configuration for motion imagery data (i.e. MPEG-2). The standard configuration for imagery will be the default mode for link acquisition.

The Interoperability Profile is not a specification—it is a profile of parameters, that when implemented in a CDL-based system, will assure interoperability with other CDL-based systems that also have implemented the same parameters. The intent of the profile is to assure interoperability between any CDL manufacturers with CDL systems through a common mode of operation. The profile is not proprietary and conforms to Open Systems Architecture. It provides guidance to the CDL systems buyers on how to achieve "end-to-end" interoperability in a relatively low-cost and straightforward manner. Many major programs have agreed to utilize the NAVAIR Interoperability Profile including: Multi-mission Maritime Aircraft (MMA), SH-60R, Fire Scout UAV, P3-AIP (ECP requested), CDL-S (CVs), Littoral Combat Ship (LCS), Small Combat Ships (LAMPS Ships), Team Portable Terminal, and other programs have showed interest.

MIDS JTRS Moves Forward; PDR a Success

Contributed by: Dave Hill, MIDS JTRS Deputy Assistant Program Manager, PMW 780, PEO C4I & Space, San Diego, California

MEETING NEWS

The Multi-Functional Distribution System Joint Tactical Radio Set (MIDS JTRS) is ready to move into its detailed design phase. This decision was reached as a result of the formal Preliminary Design Review (PDR) conducted 25 July through 5 August 2005 with over 150 representatives from various agencies participating. The on-time PDR is a major milestone for the MIDS JTRS program.

The MIDS JTRS vendors, Data Link Solutions (DLS), a Limited Liability Company consisting of Rockwell-Collins and BAE Systems) and ViaSat, conducted the PDR at ViaSat's Carlsbad, California office. Captain David Prater, USN, MIDS/Airborne Networking & Integration Program Manager for the Program Executive Office (PEO) for Command, Control, Communications, Computers, Intelligence and Space (C4I & Space) chaired the meeting. Captain Prater was supported by a team of senior Government representatives from the Assistant Secretary of Defense for Networks & Information Integration (ASD(NII)), Naval Air Systems Command (NAVAIR), JTRS Joint Program Executive Office (JPEO), National Security Agency (NSA), Space and Naval Warfare Systems Command (SPAWAR) and the US Air Force. Representatives from the MIDS nations of Italy and Germany attended the PDR in support of their national MIDS JTRS efforts. Representatives from the MIDS JTRS customer base, which includes the F/A-18, A-10, E-2D, B-1, B-52 and C-130J platform program offices, also attended.

MIDS JTRS is a Pre-planned Product Improvement (P3I) that will migrate the MIDS-Low Volume Terminal (LVT) to JTRS compliance. The MIDS JTRS acquisition strategy is for the two MIDS vendors to jointly design and develop the terminal as an Engineering Change Proposal (ECP) option under the current MIDS production contracts. Each vendor has design authority over specific elements, and shares the design with the other vendor through an Integrated Product Team (IPT). The IPT process facilitates total design disclosure between vendors to ensure a common product baseline. This disclosure increases the certainty that each vendor can successfully build and qualify the MIDS JTRS terminal, and pave the way for continuous competition during production. The successful PDR was an initial step in fulfilling this acquisition strategy.

The industry design team had met a set of contractual criteria in order to hold the PDR. The PDR was a technical review of the MIDS JTRS increment 1 (core) terminal design. The core terminal will replace the MIDS-LVT and provide Link-16, TACAN and J-voice capabilities, and be built for ready growth to host JTRS waveforms including the Airborne Networking Waveform (ANW) in the future. The main purpose was to determine whether or not the core terminal design met the contracted requirements and was ready to enter the detailed design phase.

DLS and ViaSat presented over 1000 charts on the MIDS JTRS preliminary core design. The briefing packages included requirements allocation; traceability; vendor trade studies; lamina and schematic diagrams; size, weight and power allocations and estimates; lines of code estimates; top-level design approach; and a preliminary bill of materials. Preliminary reliability, maintainability and supportability analyses were also presented.

A formal process was used to capture key design issues raised by the PDR attendees. Key issues were captured and documented as Request for Actions (RFAs). Other items and concerns were documented in a set of Request for Information (RFIs). Program issues identified included system start-up timeline, TACAN recovery after power interrupt, batteries, Built-In Test (BIT) allocation/functionality, cold-key fill and cold storage requirements.

Remaining PDR issues will be addressed at follow-on Technical Interchange Meetings (TIMs) with the platforms and NSA. Captain Prater thanked ViaSat for hosting the PDR, the MIDS vendors for the outstanding work and level of detail, and attendees for their participation.

One Network One Team

MEETING NEWS

IDLS 2005 - Annual Symposium Promotes Interoperability

Contributed by: Dr. Kevin Buck, PMW 780, PEO C4I & Space, San Diego, California

The International Data Link Society held its 2005 symposium, IDLS 2005, in Sydney, Australia from 4-7 October. This year's theme of "Making Tactical Data Links Work in the Littoral Environment" drew praise from the more than 600 attendees from over 15 nations.

Based on comments from attendees at previous IDLS symposia, IDLS 2005 presented two interest tracks. The first featured a traditional lecture series hosted by expert panel chairmen in varied disciplines including Tactical Data Link (TDL) requirements, land/littoral environment communications, and Network Centric Warfare. The second track featured a series of TDL training and education lectures by subject matter experts in fields such as Link-16 Link-11, and Variable Message Format (VMF).

In addition to the two tracks, a daily demonstration entitled "VMF in a Multi TDL Environment" featured a multi-media simulation of a combined land/sea/air littoral exercise. Realistic special effects and knowledgeable contractor and operational military personnel created a realistic presentation that proved quite popular.

Defense contractors and government entities from around the world provided informational exhibits throughout the event. Defense experts from organizations such as Viasat, Thales, and SPAWAR manned the booths to explain a range of current and future TDL products.

Northrop Grumman and the IDLS co-hosted a formal dinner on Wednesday, October 5th to recognize the efforts of the personnel involved in organizing the successful symposium. The dinner featured food and entertainment, and gave attendees a final chance to network with their professional TDL counterparts from around the world.

Next year's event, IDLS 2006, will be held from 19-21 September 2006, at the Bella Center in Copenhagen, Denmark. Details on this event or general information on IDLS may be obtained from the IDLS website: ***http://www.IDLSoc.net***

MIRB Makes a Fourth Appearance

Contributed by: MIDS Third Party Sales and Support Team, PMW 780, PEO C4I & Space, San Diego, California

The Multi-Functional Information Distribution System (MIDS) International Review Board (MIRB) held its fourth bi-annual meeting 12-14 October in Sydney, Australia. MIRB 4 was again collocated with the JTIDS International Configuration Review Board (JICRB), and in conjunction with the MIDS Implementation and Interoperability Working Group (I&IWG).

Mr. Greg Ropp chaired MIRB 4, leading a delegation from the MIDS International Program Office (IPO) that traveled to Australia to meet with MIDS third party customers and discuss technical issues related to the MIDS Low Volume Terminal (LVT). Major Andrea Tollis was the MIRB Executive Officer. Each MIDS IPO division was represented, as were MIDS participant nations. The newly formed Block Cycle Release with Additional Services (BCRAS) team, a contractor team established earlier in the year to support

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MIRB (Cont)

For more information on MIRB, the BCRAS or MIDS Third Party Sales and Support:

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MIDS LVT customers from within the MIDS IPO, also supported the meeting.

More than 130 representatives of government and industry registered for the MIRB, evidence of growing international interest in MIDS. The three-day gathering included both joint JICRB/MIRB sessions and MIRB-only sessions open only to MIDS Steering Committee-approved nations who funded the 2005 BCRAS support program. Australia, Norway and Sweden gave presentations on their own national Link-16 activities, and MIDS Production vendors EuroMIDS and ViaSat also briefed.

The meeting kicked off with a joint general session in which MIDS IPO personnel briefed on timely issues such as MIDS LVT enhancements and crypto modernization. The MIRB agenda included joint side sessions in which MIDS terminal variants were discussed with representatives from the appropriate communities. The MIDS LVT(5) or MIDS On Ship terminal was discussed during a joint maritime meeting. Ms. Laurie Foreman hosted a MIDS LVT(2) / JTIDS Class 2M joint session that was the first ever held, and deemed a resounding success by the attendees. The MIDS IPO Platform Integration division hosted a Problem Report (PR) review session for third parties. This meeting was another first of its kind, and like the joint side sessions, will be included in future MIRB agendas.

Several issues discussed during the MIRB are of major and ongoing importance to both customers and the MIDS participant nations. The opening of certain MIDS PRs into the new Third Party Problem Tracking Database (3PPTDB) was considered a success. There were further discussions on how customers will input their own PRs in the future, and the process by which MIDS nation PRs are selected for 3PPTDB entry. The way ahead for future MIRB/JICRB coordination was also under review by the MIDS IPO, MIDS participant nation representatives and heads of delegation from the BCRAS customer nations.

The next MIRB (MIRB 5) will kick off in the spring of 2006.

The Tactical Link Newsletter is now accessible from SPAWAR's public website:
http://enterprise.spawar.navy.mil

Click on "SPAWAR News." Over in the right hand margin, under "Reporter's Notebook" you can access the current and all previous issues.

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